

Dementia Precox Studies

THE MENTAL DISTURBANCES OF EPIDEMIC ERGOTISM.

*A Translation of an Article by G. A. Kolossow, of Smolensk, Russia.**

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During the studies of dementia precox, which we have made and reported in this journal and elsewhere, with more or less detail, we have found evidence that these patients were poisoned by toxic amines and our chemical studies, carried out by Dr. Julius Retinger, have demonstrated the presence of betaminazolyethylamine and other amines in the stools. It is well known that this toxic amine is a conspicuous constituent of ergot, and is generally termed ergamine by the pharmacologists. Beside ergotoxine, tyramine, ergamine, agmatine, choline, iso-amylamine, cadaverine, and putrescine, ergot contains a large amount of fixed oils. If we take three of the most abundant toxins of ergot and compare their physiologic action we see that they are partly antagonistic and partly synergic.

	Seat of Action	Blood Vessel	Pregnant Uterus	Blood Pressure
Ergotoxine	Peripheral Nervous System	Constriction	Contracts+	+++
Tyramine	Peripheral Nervous System	Constriction	Contracts+	++
Ergamine or Histamine	Some Portion of the Muscle	Wide Dilatation	Contracts ++++	---

In the action of ergot as well as in cecal stasis with the production of toxic amines the symptomatic result is the balance of these often conflicting factors.

It seems almost conclusive to us that dementia precox is due in whole or in part to an intoxication from toxic amines produced by the growth of colon bacilli on amino acids poured into a cecum in which there exists a stasis of three or four days, due to spasm of the colonic sphincter, or similar mechanical conditions. Therefore, we sought out in the literature the effect of chronic ergot poisoning. The following translation is of an

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article that proved so illuminating that it is offered as a valuable support to the clinical and chemical findings already published. B. H.

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Besides the severest and most frequent complications of chronic ergot intoxications there are various forms of mental disturbances. The development of these, under the influence of this intoxication, has been the study of many observers since the epidemics of the sixteenth and eighteenth centuries. In the studies of that time one finds, as manifestations or results of ergotism, many references to a feeling of heaviness in the head, dizziness, headache, insomnia, disturbed dreams, absent-mindedness, mental weakness, general intellectual depression, dementia, melancholia, mania, and desire for excess verging into insanity. Cases are also described in which patients, in attacks of insanity, threw themselves into fire or water, jumped out of windows, or ran amuck. The mental complications of ergotism were presented in the researches of Taube, Wichmann, Leidenfrost, and Moscati, at the end of the eighteenth century. In a very thorough research in which Taube first endeavored to demonstrate the development of tabes from ergotism, he said, that *mental disturbances due to ergotism occur very frequently*. Dementia is, according to his statements, so frequently observed in ergotism, that scarcely anyone who has ever suffered with ergotism, has not deteriorated to a more or less noticeable degree. As an evil consequence of ergotism he mentions raving madness, in which *it was necessary to place the patient in chains*. Besides he has not rarely seen attacks of epilepsy and hysteria. Stefanowitsch Donzow, in his experience in an epidemic in Russia near the end of the eighteenth century, also observed the development of dementia under the influence of ergot poisoning. Observers in nearly all of the epidemics in the latter half of the eighteenth and the first half of the nineteenth centuries, refer to the more or less frequent occurrence of mental disturbances (Wagner, Griepenkerl, Pockels, Desnos, and Leteurtre). In the accounts of epidemics of ergotism of that period, emphasis is placed upon the extreme restlessness of the patients, loss of mind, stunting of mental ability, and melancholia. The first special psychiatric researches of mental disease accompanying ergotism were made in the early eighties of the last century by Siemens and Tuzek, who found material in the coincident epidemic of western Europe, which broke out in the vicinity of Frankenburg-Hessen in 1879. These authors laid the foundation for research into the pathological anatomy of ergotism, and, in particular, noticed the changes in the nervous system.

During the epidemics of the 1870's and 1880's in Russia, many cases of mental disturbance were observed. During the seventies Ter-Grigorjantz, of Kostroma, studied cases of epilepsy, disturbed dreams, appearances of

dementia, and other psychic disorders that accompanied ergotism. W. W. Swjatlowski, in the year 1879, during an epidemic of ergotism in Nowgorod, observed among the patients severe weakening and stunting of the intellect, dementia, and melancholia. In reports of an epidemic at Poltawa in 1881, which is presented in the work of D. D. Achscharumow, attention is directed to the fact that many of the patients had the appearance of insane people. They stormed aimlessly first to one side and then to the other, laughed without reason, gave incomplete answers to questions that they made no effort to understand, many were, as the author emphasizes, paralyzed for life, or remained weak minded. In the reports of psychiatric hospitals at Poltawa, even in later years (1886-1890) the statistics of mental diseases include, though at a low percentage (0.07), cases of raphanic psychoses. N. W. Schtscherbina, in the year 1880, noted various psychoses with raphanic intoxication at Kiev. These cases were marked by loss of mental ability, delirium, and quick sleepiness on mental exertion. W. P. Kurtshinski, in 1887 at Tschernigou, saw many complications of psychoses with ergotism and epilepsy. In the report of Dr. Foinitski of the Psychiatric Hospital of Tschernigou for the year 1888, are recorded eight cases of raphanic epilepsy. Especially large numbers of cases of mental disease occurred during the severe epidemic of ergotism at Wjatka in 1889 and 1890. This epidemic furnished Reformatski with material for his book upon psychic disturbances in relation to ergotism, which is at present the most thorough and detailed study in all the literature of ergotism. N. N. Reformatski analyzed the problem and established the fact that ergotism is frequently complicated by psychic disease. In the vicinity of Nolin, according to his figures, this complication appeared in more than thirty per cent of all cases of ergotism.

After N. N. Reformatski had exhaustively studied the physical and neuropsychic manifestations in fifty-two cases of ergot psychoses, he divided them into seven types. The most frequent form, according to his estimate is acute dementia with or without imbecility, which generally appears immediately after a series of spasms with loss of reason, occasionally only several months after the first signs of the intoxication. But cases did appear in which these symptoms developed quickly, as for example, in one case on the second day. The patients of the first type have the characteristic, stupid expression of an imbecile, occasionally accompanied by paralysis of the facial nerves. Not infrequently they sit with head and body bent forward. At intervals they fix their eyes upon something near them or look stupidly about them, reminding one in many respects of a drunken person. They tremble violently, walk uncertainly, and talk indistinctly, *but for the most part they remain absolutely quiet.* Their

apperceptiveness is much reduced. They have great difficulty in understanding questions put to them and answer questions reluctantly and lazily. Their visual perception is very uncertain. Interest in their surroundings and the memory are much decreased. Orientation is markedly circumscribed, in relation to the surroundings it is extraordinarily apathetic. Now and then delirium, delusions, hallucinations, fear, and angry out-breaks occur, and, during these conditions, cramps and epileptic attacks often take place. Immediately after these attacks their condition becomes worse, but in exceptional cases it improves.

The second form of the dementia, namely, that without imbecility, also develops after a series of spasms or epileptic attacks. The similarity between this group and the preceding one is, that they have the same disturbances in attention, apperception, intellect, and orientation in regard to place and time. In contrast, however, the disturbance of intellect is less severe, the facial expression is more alert, the movements are freer, the speech clearer, they are less apathetic, displaying a keener interest in their surroundings. Now and then a patient in this group betrayed great curiosity. *Moods fluctuated suddenly* from a feeling of active gaiety to an abrupt sense of depression and irritability. Sometimes these cases showed fear, illusions, and insane ideas. Many of the patients were of an impulsive nature. In two cases the disturbance revealed itself in a desire to put everything into the mouth, regardless whether it was food or a burning match. Patients in this group, after an epileptic attack, began to show either imbecility or excitation.

The third type of mental disturbance in ergotism is acute dementia, with attacks of excitement due to illusions, bad dreams, hallucinations, and visual illusions similar to auditory illusions. As in the imbecile group, this excitement generally followed an epileptic attack, and sometimes persisted for days and even weeks. In this group the disturbance of the sensorium was severe, the patients failed to adjust themselves to time and place, and failed to recognize relatives. An indication of the severity of these attacks was shown in the case of a female patient who, without realizing the fact, gave birth to a child while she was in this condition and for many days after the child's birth had no idea of its existence. Another woman did not know her own child and pushed it from her. Not infrequently patients in this group are afraid of threatening fatal accidents. They believe themselves to be drowning, or they see a fire and fear to be burned alive. Again others believe that some one is suddenly attacking them in order to butcher or strangle them. Some see robbers attacking their homes, and others see the devil himself. Possessed by such fears,

the patients are a danger to themselves and to others. They shriek wildly, cry, attempt to escape, or to throw themselves out of the window. Occasionally they show an inclination to annoy the people about them by beating or biting themselves. Now and then there are periods of quiet, but even at such times they retain serious mental defects. After a spell of strong emotion they sometimes fall into a somnolent state lasting, in some instances, as long as two days. When the period of excitement has spent itself the patient evidences a marked deterioration in physical and psychical strength.

Psychic disturbance characterized by hallucinatory confusion occurs more rarely. Among these are disturbances of sensation, hallucinations, visual and auditory illusions, fluctuating moods and fears, but with the return of reason the patients seem to be unable to recall these attacks. In contrast to the preceding group the patients in this group have pleasant experiences accompanying their illusionary ideas. In the persons about them they did not see enemies, but gods, saints, members of the nobility, and in consequence, they were overcome by a great joy, prayed to them, sank down on their knees before them and believed themselves to be in paradise.

The fifth form of ergot intoxication observed by N. N. Reformatski, was melancholia with illusionary ideas, fears, and a sense of oppression, delusions, disturbances of the sensorium, absent mindedness, and impulsive actions. Those patients deluded by an idea of their sinfulness often refused nourishment, hid themselves as unworthy their surroundings, prayed constantly, or, when especially sensitive to the delusion of severe oppression, they sought to escape or commit suicide.

Besides these five forms of psychoses N. N. Reformatski noticed in many patients different grades of the disturbed sensorium, fluctuation of mood, and loss of intellect. Under the influence of the disease many became timid, irritable and dull. They showed a decline in mental capacity and a departure from moral principles.

On the whole, the results of N. N. Reformatski's research are closely allied to those of Siemens and Tuczek. And yet his cases reveal a greater variety of psychic disturbances and more frequent instances of delusion. This difference is due to differences in the character of the epidemics studied. In so far as N. N. Reformatski compared the ergot psychoses to other intoxications he found them quite similar to the psychoses of pellagra. He also undertook an exhaustive study of the cerebral changes in ergotism, even though he was successful in obtaining only a few post mortems for such a research.

He made in all nine autopsies and found six cases of pachymeningitis,

in seven inflammation of the pia mater, in one circumscribed hyperaemia of the dura mater, in four chronic inflammation of the cerebrum, in three anaemia, in four oedema, and in isolated cases granulations at the base of the third or fourth ventricles, sclerosis of the blood vessels of the base of the brain, and hyperaemia of the gray matter. In the microscopic examination of four cases two of them revealed circumscribed areas of extravasation and softening in the muscular layer, and in the Corpus candatum a pigmentary oil degeneration of the nerve cells, swelling, and developing of vacules. In two cases, on the other hand, there was an enlargement of the pericellular and perivascular cavities, as well as proliferation of the vessels about the ground tissues.

During the same epidemic at Wjatka, Naunow and Dejurin also studied the psychoses.

The severe complications of ergotism being discussed were carefully observed in all succeeding epidemics. P. A. Loschtschilow noted, during the epidemic at Kostroma in 1904, besides epileptic attacks, cases of dementia with and without imbecility. W. A. Selenkin noted, during the violent epidemic of ergotism at Wjatka in 1905 and 1906, numerous cases of mental disturbance. According to his report affections of the mind, insomnia, timidity or apathy attended nearly every patient. In many stupor and loss of memory were observed, while the mental disturbance was so marked in numerous cases that the psychiatric hospitals had to be enlarged. Among these patients an extraordinary number were disturbed by persecution mania, hallucinations, and a depression verging on dementia or idiocy. N. A. Gluschkow, in 1907, observed a disturbed mental condition in a Tartar, at the hospital at Kasan, which had developed on a basis of ergotism acquired during an epidemic at Kasan in 1905 and 1906, and which he diagnosed as primary acute dementia with symptoms of amentia (according to S. S. Korsakow) or as primary curable dementia (according to Krafft-Ebing). After four and a half months of hospital life the patient was much improved.

In the year 1902 in the laboratory of W. M. Bechterew a thorough study was made and published by S. D. Kolotinski under the title "Chronic Ergotism and the Attending Changes in the Central Nervous System of Animals." From the standpoint of the psychic disturbances in ergotism this article is of great significance. Its principal conclusions follow:

- 1 The nerve elements of the brain and the spinal cord suffer anatomico-pathologic changes after primary changes in the blood vessels.

2. Changes in the nerve cells are observed in all parts of the central nervous system. They are in some instances simple, chronic atrophy of

the cells, but sometimes they reveal, by the use of Nissl's stains, varying forms of chromatolysis.

Valuable material explanatory of the mental disturbances and nerve phenomena of ergotism has been furnished by the recent work of A. W. Grigoriew, N. F. Wingradow and D. D. Krylow, on the changes in blood vessels and the peripheral nervous system and the internal organs in ergotism, as well as in their pharmacologic work on ergot rye. Attention should be called to the observations of Dawidsohn on psychic disturbances in patients after the use of pure ergot to cause abortion. In animals poisoned with ergot, several writers, among them A. J. Grünfeld, have noted a mental reaction like that of melancholia.

Thus we find the state of the question of psychoses in ergotism at the time of the epidemic of this disease in 1909 and 1910. In these years psychic disturbances entered as a complication nearly everywhere. S. Netschaewa-Kotelnikowa in Wladimir observed among the patients prolonged cases of somnolency, occasionally violent patients, purposeless laughter, inclination to cry, visual hallucinations, and, sometimes, the complete picture of dementia. S. W. Klutsharew saw, in the same district, cases in which moods of depression, that developed into terrible anguish, prevailed. There were insane ideas, visual delusions, and some patients seemed to be drunk, for they were talkative, inert, and showed an incorrect association of ideas. Their walk was uncertain and wobbly. Other patients displayed a depressed condition with periods of confusion and hallucinations which disappeared after from two to four weeks leaving no traces. On the other hand, some patients presented a seemingly characteristic picture of melancholia. N. N. Ostrowski, who handled 375 cases of ergotism in the neighborhood of Wladimir, often noted psychological disturbances, even in cases where the external symptoms of the disease were slight, in which the patient suffered a more or less severe loss of mind. Many were incapable of solving the simplest arithmetical problems, in severe cases the patients forgot their names as well as the names of their relatives. In fifteen cases the mental disorder was so great that it was necessary to send them to the psychiatric hospital. Some of these patients died.

The last epidemic at Twer furnished material for the special psychiatric study of M. I. Gurewitsch. As M. I. Gurewitsch summarizes his research he comes to the conclusion that psychoses due to ergot intoxication reveal themselves chiefly in a disturbance of the sensorium, the emotional centers, and a lowering of the intellect, the latter of which occasionally becomes imbecility. He emphasizes that one may classify these cases in one or the other form of melancholia, dementia, mania and hallucinatory insanity. But he does not do it because, in his opinion, the symptomatologic

scale at the time of diagnosis is unreliable, especially when the cases have a known etiology. But even then, excepting the etiology, it is his belief that the uniformity of ergot psychoses is grounded upon the clinical symptoms that he mentions, namely, disturbance of the sensorium, of the emotional centers, and of the intellect. When M. I. Gurewitsch compares the peculiarities of ergot-psychoses with those of other psychoses, he concludes that they are closely allied to the etiology of epilepsy and alcoholic psychoses.

At the post mortem of three ergot cases, one showed opacity of the pia mater and numerous ecchymomas in the brain substance. In another was found hyperaemia of the cerebral meninges, and in the third anaemia of the brain. The microscopic examination presented a considerable increase of neurone centers. Examinations of the spinal cord confirmed the presence of ergot-tabes.

In addition to the material already presented in this paper there is little literature concerning ergot intoxications. Special investigations of the subject are five in number, two German and three Russian, and only one among the latter presents illustrative cases. Even these thorough studies with their copious details leave, in my opinion, an opening for further study. The authors have all studied their cases in an advanced stage of the disease, while the stage preceding the mental disturbance, as well as the earliest manifestations of the latter, was not observed by any of these writers. Besides all of their cases were grave enough to demand attention from psychiatric hospitals. In consequence of the scarcity of literature germane to our subject, I should like to present a few personal observations.

The patients studied came under my care soon after their illnesses began. In many of the cases I saw the development of the mental disorder. In one case, that of a thirteen year old boy without pathological heredity, the mental symptoms became evident, following a series of typical spasms, eight days after his sickness set in. The psychosis was first noticed in a disturbance of the sensorium, loss of ability to adapt himself to surroundings, in constant changes between depressed and disturbed moods, fear, and eventually, under the influence of delusions, amnesia and morbid hunger developed. The psychic disturbance disappeared as quickly as it had come, that is, within a period of eight days.

In the second case the mental disorder developed in a young man of twenty years, who had always been robust and healthy up to the time of this ergot intoxication. He had no pathological heredity, no syphilis, and no alcoholism in his anamnesis.

Soon after the spasms mental disorder began. The first sign was a loss of orientation, a decline in perceptive faculties, an exalted mood,

unpleasant visual hallucinations, fear, insane ideas, amnesia, and epileptic attacks. At the same time changes in the nervous system were observed. Within a month his psychosis had passed. Three months later, however, the patient suffered from abdominal typhus, and the mental phenomena immediately returned more markedly than in the ergot intoxication.

In the third case, a thirteen year old boy, who had been healthy up to the present illness, presented the same phenomena as did the two former cases, and immediately after a series of spasms the psychosis set in. There was a faint but definite disorder of the sensorium, depressed mood, difficulty in thinking, and for a time absent mindedness, due to violent attacks of excitement as well as a voracious appetite, and objective changes in the nervous system. After several days the psychic disorders weakened and the patient began to improve.

A different picture of mental disturbance was noted in three other cases where the condition of stupor prevailed.

In five cases brief attacks of rage, apparently with loss of reason, were noted. The patients suddenly shrieked, not, however, because of the pain resulting from the spasm, but seemingly under the influence of hallucinations, or they would wake up at night, spring out of bed and scold without reason. Such cases were usually of brief duration and not infrequently recovered. As a rule they were observed during the first two weeks of sickness, in spring as well as in autumn.

One patient, a farmer of forty-six years, showed peculiar disturbances. He was brought to the hospital on the eighth day of his illness, while in an unconscious condition. Here, without seeming to regain consciousness, he at first made aimless movements with his legs, he would place himself *à la rache* raising his legs up and holding himself in that position for rather long periods (ten minutes), again, with both legs in the air he would swing them with a rotary motion. He made few movements with his arms, and occasionally he would roll from side to side. He also tore his shirt. His expression was that of an imbecile. On the fifth day he began throwing himself about in bed, or standing up in it. At the same time the heart weakened and toward evening he died.

The inclination of this patient to place and hold the extremities in certain positions has been recorded by other students of ergotism.

We had twelve other cases of ergotism accompanied by various mental disturbances. Two of these twelve cases presented the picture of acute mania, one case gave the picture of depressed mood with difficulty in thinking, while the sensorium did not seem to be much affected. A third case gave the picture of pure stupor, five others experienced temporary attacks of violence and, finally, in one case with peculiar motor excitation,

incontinence and unconsciousness. Several of the cases described can be classified under one or the other disease forms. Accordingly I share the conclusion of M. I. Gurewitsch which has been previously mentioned.

With the foregoing presentation as a basis, I believe that I may safely draw the following conclusions:

1. Mental disturbance as a complication of ergotism is frequently noted (in my experience 27.3 per cent of all cases).

2. It may develop in patients whose anamnesis presents no pathologic heredity, no syphilis, and no alcoholism.

3. Adolescents are particularly susceptible.

4. The first symptoms of mental disturbance may be seen in the first week of sickness.

5. According to the degree of intoxication and the personal condition of each patient the psychic disturbance may reveal itself in various ways, from temporary unconsciousness with violent outbreaks to genuine psychosis.

6. Occasionally the mental disturbance is a severe complication of the organism, and then the disease may be classed in the third grade of ergotism.¹

7. Cases in which mental disturbance follows epileptic attacks, as well as those cases accompanied by epileptic attacks, usually recover with difficulty.

8. In ergotism the mental disturbance is revealed by different symptoms, similar to those observed in other forms of intoxications, so that there is no particular form of ergot psychosis.

9. Frequently an ergot psychosis passes as rapidly as it developed.

10. In most cases of ergotism the mental disorder is accompanied by objective changes in the nervous system (weakening or loss of the knee reflex, dilation, sometimes unequal, of the pupils, attacks of clonic spasms and urine incontinence).

¹In my opinion ergotism cases may be divided into three classes, according to the clinical findings. The first, during the general feeling of ill health, including headaches as well as paraesthesia; the second, in which spasms are added to the preceding symptoms; third, in which prolonged mental disturbance develops or in which the disease goes into coma.—Kolossow.